

WHAT IS CLAIMED IS:

- 1 1. A chemical mechanical polishing method, comprising:  
2 determining a vertical position of a top surface of a polishing pad in a chemical  
3 mechanical polishing system using a pad height sensor;  
4 positioning a window disposed in an aperture of the polishing pad such that the  
5 top surface of the window is at about the same vertical position of the top surface of the  
6 pad based on the determination; and  
7 polishing a wafer.
- 1 2. The method of claim 1, further comprising:  
2 determining an endpoint of the polishing; and  
3 stopping the polishing upon reaching the endpoint.
- 1 3. The method of claim 1, further comprising draining slurry and waste product from  
2 the aperture.
- 1 4. The method of claim 1, further comprising:  
2 lowering the window; and  
3 conditioning the pad after lowering the window.
- 1 5. The method of claim 1, wherein the window is coated with a slurry-phobic  
2 substance.

1 6. The method of claim 1, wherein determining the height comprises:

2 determining a distance between a pad height sensor positioned above a polishing  
3 pad and the polishing pad; and

4 subtracting the determined distance from a known distance between the pad  
5 height sensor and a surface on which the polishing pad rests.

1 7. The method of claim 1, further comprising:

2 positioning additional windows disposed in apertures of the polishing pad such  
3 that the top surface of each window is at about same vertical position of the top surface of  
4 the pad.

1 8. A CMP system, comprising:

2 a polishing pad having an aperture;

3 a pad height sensor positioned above the polishing pad;

4 a window vertically moveable within the aperture; and

5 a window raising mechanism capable of adjusting the vertical position of the  
6 window based on information from the pad height sensor.

1 9. The system of claim 8, further comprising an endpoint measurement sensor

2 positioned beneath the window.

1 10. The system of claim 8, further comprising a drain disposed in the aperture.

- 1 11. The system of claim 8, further comprising a pad dresser.
- 1 12. The system of claim 8, wherein the window is coated with a slurry-phobic  
2 substance.
- 1 13. The system of claim 8, further comprising additional windows, each window  
2 disposed in an additional aperture of the polishing pad, and wherein each window is  
3 movable between a lowered position and raised position at about the height of the  
4 polishing pad as determined by the pad height sensor.
- 1 14. The system of claim 8, wherein the window rests on an inflatable toroid coupled  
2 to a pump.
- 1 15. The system of claim 8, wherein the window rests on a plurality of cylinders, each  
2 partially disposed in an airtight chamber coupled to a solenoid valve.
- 1 16. A CMP system, comprising:  
2 means for determining a vertical position of a top surface of a polishing pad in a  
3 chemical mechanical polishing system;  
4 means for positioning a window disposed in an aperture of the polishing pad such  
5 that the top surface of the window is at about the same vertical position of the top surface  
6 of the pad based on feedback from the means for determining and

7 means for polishing a wafer.

1 17. A CMP control system, comprising:

2 a rate/height data structure holding data indicating the relationship between the  
3 vertical position of a window disposed within an aperture of a polishing pad and control  
4 data for a window-raising mechanism;

5 a sensor engine capable of receiving distance data from a pad height sensor  
6 positioned above the polishing pad;

7 a pump engine, communicatively coupled to the sensor engine and the data  
8 structure, capable of sending commands to the window-raising mechanism based on  
9 control data related to the received distance data, to raise the window to about the height  
10 of the polishing pad.

1 18. The system of claim 17, wherein the window raising mechanism is a pump  
2 coupled to an inflatable toroid.

1 19. The system of claim 17, wherein the window raising mechanism is a solenoid  
2 valve coupled to a plurality of chambers having cylinders disposed therein.

1 20. A computer-readable medium having stored thereon instructions to cause a  
2 computer to execute a method, the method comprising:  
3 receiving distance data from a pad height sensor positioned above a polishing pad;  
4 calculating a height of the polishing pad based on the received distance data; and

5 transmitting an instruction to a window-raising mechanism based on the  
6 calculation that will the raise a window disposed within an aperture of a polishing pad to  
7 about the calculated height of the polishing pad.

1 21. The computer-readable medium of claim 20, wherein the window raising  
2 mechanism is a pump coupled to an inflatable toroid.

1 22. The computer-readable medium of claim 20, wherein the window raising  
2 mechanism is a solenoid valve coupled to a plurality of chambers having cylinders  
3 disposed therein.

1 23. A chemical mechanical polishing system, comprising:  
2 a platen; and  
3 a raised window coupled to the platen and sized to fit within an aperture of a  
4 polishing pad.

1 24. The system of claim 23, further comprising a drain system disposed in the platen,  
2 the drain system having an orifice positioned near the window.

1 25. The system of claim 23, wherein the window is coupled to the platen via a  
2 window-raising mechanism.